# 3.1 What Is a Rational Number?

**FOCUS**

- Compare and order rational numbers.

-19
-20
-21

The label on a package of frozen cranberries says that it must be stored at a temperature between −18°C and −22°C. Name some possible temperatures. How could these temperatures be shown on a number line?

Sep 22-10:11 PM

# 3.1 What Is a Rational Number?

**Definition of a Rational Number**

A rational number is any number that can be written in the form $\frac{m}{n}$, where $m$ and $n$ are integers and $n \neq 0$.

$\frac{5}{0}$ = Error

Not all numbers can be written as fractions. For example, $\pi$ and $\sqrt{2}$ are numbers that you have used in calculations but they cannot be written as fractions. These are **irrational numbers**.

$\pi$

$\sqrt{\text{prime}}$.

2 17
3 19
5 23
7 29
11
13

$2 = \frac{2}{1}$

$0.5 = \frac{1}{2}$

Sep 22-7:20 PM

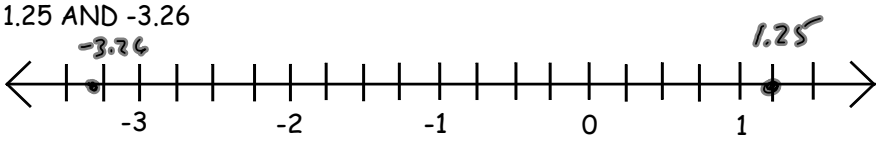
**Example 1** Writing a Rational Number between Two Given Numbers

Write 3 rational numbers between each pair of numbers.

a) 1.25 and −3.26 b) −0.25 and −0.26 c) $-\frac{1}{2}$ and $\frac{1}{4}$ d) $-\frac{1}{2}$ and $-\frac{1}{4}$

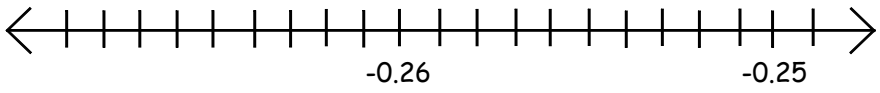
SOLTUIONS:

A) 1.25 AND -3.26




-3 -2 -1 0.75

B) -0.25 AND -0.26 −0.250 −0.260




−.257 −0.253
−0.252

Sep 22-7:29 PM

**Example 1** Writing a Rational Number between Two Given Numbers

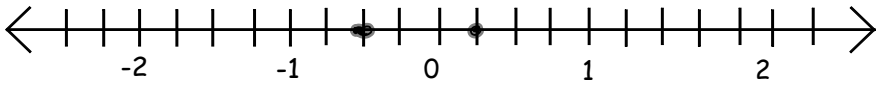
Write 3 rational numbers between each pair of numbers.

a) 1.25 and −3.26 b) −0.25 and −0.26 c) $-\frac{1}{2}$ and $\frac{1}{4}$ d) $-\frac{1}{2}$ and $-\frac{1}{4}$

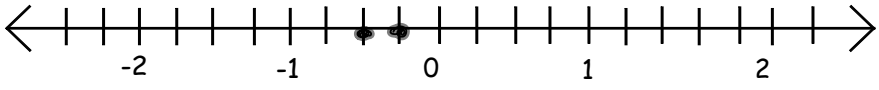
SOLTUIONS:

C) $\frac{-1}{2}$ and $\frac{1}{4}$ $\frac{-4}{8}$ $\frac{2}{8}$

-¼ ¼ $\frac{-3}{8}$ $\frac{-2}{8}$ $\frac{-1}{8}$ $\frac{1}{8}$




D) $\frac{-1}{2}$ and $\frac{-1}{4}$ $\frac{-4}{8}$ $\frac{-2}{8}$ $\frac{-8}{16}$ $\frac{-4}{16}$




Sep 22-7:29 PM

## Example 2 Ordering Rational Numbers in Decimal or Fraction Form

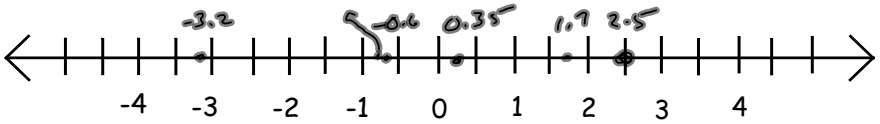
a) Use a number line. Order these numbers from least to greatest.
$0.35, 2.5, -0.6, 1.7, -3.2, -0.\overline{6}$

b) Order these numbers from greatest to least. Record the numbers on a number line.
$-\frac{3}{8}, \frac{5}{9}, -\frac{10}{4}, -1\frac{1}{4}, \frac{7}{10}, \frac{8}{3}$

**SOLTUIONS:**

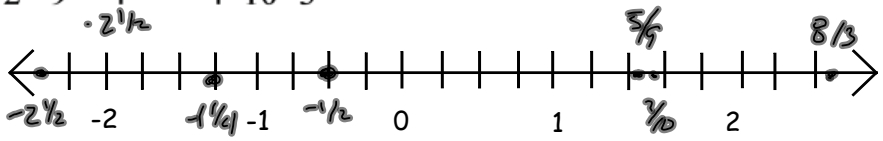
left -> value is smaller
right -> value is greater

A) 0.35, 2.5, -0.6, 1.7, -3.2, $-0.\overline{6}$




$-3.2, -0.\overline{6}, -0.6, 0.35, 1.7, 2.5$

B) $\frac{-1}{2}, \frac{5}{9}, \frac{-10}{4}, -1\frac{1}{4}, \frac{7}{10}, \frac{8}{3}$ $2\frac{2}{3}$




$-10/4, -1\frac{1}{4}, -\frac{1}{2}, 5/9, 7/10, 8/3$

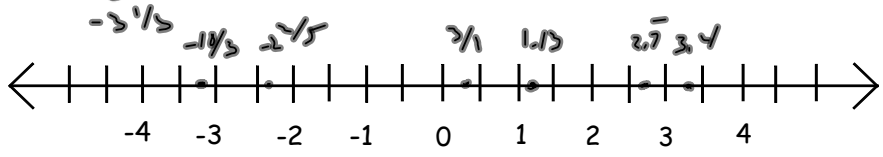
Sep 22-7:29 PM

## Example 3 Ordering Rational Numbers in Fraction and Decimal Form

Order these rational numbers from least to greatest.
$1.13, -\frac{10}{3}, -3.4, 2.\overline{7}, \frac{3}{7}, -2\frac{2}{5}$
Record the numbers on a number line.

**SOLTUIONS:**

A) $1.13, \frac{-10}{3}, 3.4, 2.\overline{7}, \frac{3}{7}, -2\frac{2}{5}$




$\frac{-10}{3}, -2\frac{2}{5}, \frac{3}{7}, 1.13, 2.\overline{7}, 3.4$

Sep 22-7:29 PM

## Discuss the ideas

1. How can you use what you know about fractions and integers to explain what a rational number is? $\frac{3}{1}$ $\frac{m}{n}$
2. How are positive fractions and their opposites related on a number line?
3. In the definition of a rational number as $\frac{m}{n}$, where $m$ and $n$ are integers, why is it important that $n \neq 0$? $3/0 = \text{Error}$
4. Describe the numbers that are rational, but are not positive fractions or integers. $-\frac{1}{2}$ $-3$

## Reflect

What is a rational number? List 3 rational numbers in decimal form and 3 rational numbers in fraction form. Show the numbers on a number line.

0.5, −0.4, 2.23 1/2, 1/4, −7/8

Sep 22-7:40 PM

## Practice

Page 101: # 7,9,10,12

Page 102: # 13,15,19,21

Page 103: # 24,25

If Finished in class then attempt these questions

Page 103: # 26, 27

Sep 22-7:40 PM